RAVI MATHS TUITION CENTER, CHENNAI-82. WHATSAPP.- 8056206308

12TH CBSE PHYSICS CHAPTER TEST Electromagnetic Induction 1

12th Standard CBSE

Physics

Exam Time : 01:30:00 Hrs

Total Marks : 60

1) In the relation ϕ = BA cos θ, θ is angle..... 1

(a) which normal to surface area makes with the direction of magnetic field

(b) which magnetic field makes with the surface

(c) which is never constant (d) none of the above

2) SI unit of magnetic flux is 1

(a) henry (b) weber (c) coulomb (d) volt

3) The cause of induced e.m.f. is 1

(a) magnetic flux (b) magnetic field (c) area

(d) change in magnetic flux

4) Choose the wrong statement: 1

(a) When ever the amount of magnetic flux linked with a circuit changes, an e.m.f. is induced in the circuit.

(b) The induced e.m.f. lasts so long as the change in magnetic flux continues

(c) Large the amount of magnetic flux linked with a circuit, greater is the e.m.f. induced in it.

(d) The direction of induced e.m.f. is given by Lenz's Llaw.

5) Amount of charge induced in a circuit of resistance R is given by 1

(a) $dQ = (d\phi) \times R$ (b) $dQ = \frac{d\phi}{R}$ (c) $dQ = R^2 d\phi$ (d) $dQ = \frac{d\phi}{R^2}$

6) Which one is not an application of eddy currents? 1

(a) Magnetic brakes (b) speedometers (c) Induction furnace

(d) Transformers

7) Out of the following, choose the correct relation 1

(a) 1henry = $\frac{1\,volt}{1\,ampere}$ (b) 1henry = $\frac{1\,amp}{1\,volt}$ (c) 1 henry = $\frac{1volt}{1\,amp/sec}$

(d) 1 henry = $\frac{1volt}{1\,amp\,.\,sec}$

8) When number of turns of a soleniod is doubled, its self inductance becomes k times, where k= 1

(a) 2 (b) 1 (c) 8 (d) 4

9) The magnetic flux linked with a coil is ϕ = (3t-2t+1) milliweber. The e.m.f. induced in the coil at t = 1sec is 1
(a) 4V (b) 4×10^{-3}V (c) 6V (d) 4×10^{3}V

10) A wire of length 2m moves with a speed of 5m/s perpendicular to a magnetic field of induction 0.1 Wb/m^2. The e.m.f. induced in the wire is 1
(a) 1 V (b) 10 V (c) 5 V (d) 2 V

11) Choose the quality whose SI unit is not ohm. 1
(a) Resistance (b) Reactance (c) Capaciatnce (d) Impedance

12) Which of the following does not have the dimension of time? 1
(a) RC (b) $\frac{L}{R}$ (c) $\frac{R}{L}$ (d) $\sqrt{LC}$

13) Phase difference between voltage across L and C in series is 1
(a) 0° (b) 90° (c) 180° (d) 360°

14) The peak value of alternating e.m.f. in a generator is given by e_0 = 1
(a) NAB (b) NAB ω (c) NAB v (d) none of these

15) The frequency of a.c. generated depends on 1
(a) speed of rotation of coil (b) amplitude of a.c (c) size of coil
(d) all the above

16) In which of the following appliances, Fleming's right hand rule for direction of induced current is not applicable? 1
(a) a.c.generator (b) d.c.generator (c) induction motor (d) transformer

17) The split ring arrangement is used by η = 1
(a) a.c. generator (b) d.c generator (c) choke coil (d) transformer

18) The relation $\frac{E_s}{E_p} = \frac{n_s}{n_p}$ is applied only to 1
(a) a.c. generator (b) d.c. generator (c) induction coil
(d) step up/step down transformer

19) The self inductance L of a solenoid of length l and area of cross-section A, with a fixed numer of turns N increase as 1
(a) l and A increase (b) l decrease and A increase
(c) l increase and A decrease (d) both l and A decrease

20) An e.m.f. is produced in a coil, which is not connected to an external voltage source. This can be due to 1

(a) the coil being in a time varying magnetic field

(b) the coil moving in a time varying magnetic field

(c) the coil moving in a constant magnetic field

(d) the coil is stationary in external spatially varying magnetic field, which does not change with time

21) The mutual inductance M_{12} of coil 1 with respect to coil 2 1

(a) increases when they are brought nearer

(b) depends on the current passing through the coils

(c) increases when one of them is rotated about an axis

(d) is the same as M_{21} of coil 2 with respect to coil 1

22) In a uniform magnetic field of induction B, a wire in the form of semicirclr of radius r rotates about the diameter of the circle with angulat frequency . The axis of rotation is perpendicular to the field. If the total resistance of the circuit is R, then the mean power generated per period of rotation is 1

(a) $\frac{B\pi r^2\omega}{2R}$ (b) $\frac{(B\pi r^2\omega)^2}{8R}$ (c) $\frac{(B\pi r\omega)^2}{2R}$ (d) $\frac{(B\pi r^2\omega)^2}{8R}$

23) A conducting circuit loop is placed in a uniform magnetic field of induction B tesla with its plane normal to the field. Now, the radius of the loop starts sharinking at the rate dr/dt. The induced emf at the instant when the radius is R is: 1

(a) $\pi rB\left(\frac{dr}{dt}\right)$ (b) $2\pi rB\left(\frac{dr}{dt}\right)$ (c) $\pi r^2\left(\frac{dr}{dt}\right)$ (d) $\left(\frac{\pi r^2}{2}\right)^2\left(\frac{dr}{dt}\right)$

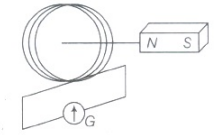
24) A coil having n turns and resistance R is connected with a galvanometer of resistance 4R. This combination is moved in time t seconds from a magnetic flux ϕ_1 Weber to ϕ_2 Weber. The induced current in the circuit is : 1

(a) $\frac{\phi_2-\phi_1}{5Rnt}$ (b) $\frac{-n(\phi_2-\phi_1)}{5Rt}$ (c) $\frac{-(\phi_2-\phi_1)}{Rnt}$ (d) $\frac{-n(\phi_2-\phi_1)}{Rt}$

25) A physicist works in a laboratory where the magnetic field is 2T. She wears a necklace enclosing area $0.01m^2$ in such a way that the plane of the necklace is normal to the field and is having a resistance R = 0.01Ω. Because of power failure, the field decays to 1 T in time 10^{-3} s. Then what is the total heat produced in her necklace? 1

(a) 10 J (b) 20 J (c) 30 J (d) 40 J

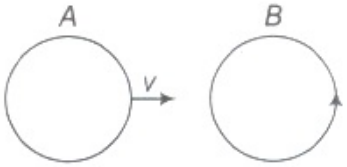
26) Current in the coil is larger 1



(a) when the magnet is pushed towards the coil faster
(b) when the magnet is pulled away the coil faster (c) Both (a) and (b)
(d) Neither (a) nor (b)

27) The instantaneous magnetic flux linked with a coil is given by $\varphi = (5t^3 - 100t + 300)$ Wb. The emf induced in the coil at time t = 2 s is 1
(a) -40V (b) 40V (c) 140V (d) 300V

28) There are two coils and B as shown in figure. A current starts flowing in B as shown, when A is moved towards B and stops when A stops moving. The current in A is counter clockwise. B is kept stationary when A moves. We can infer that 1
(a) there is a constant current in the clockwise direction inA
(b) there is a varying current in A (c) there is no current in A
(d) there is a constant current in the counter clockwise direction in A



29) A horizontal straight wire 20 m long extending from east to west is falling with a speed of 5.0 ms^{-I} at right angles to the horizontal component of the earth's magnetic field 0.30 x 10^{-4} Wbm^{-2} The instantaneous value of the emf induced in the wire will be 1
(a) 6.0 mV (b) 3 mV (c) 4.5 mV (d) 1.5 mV

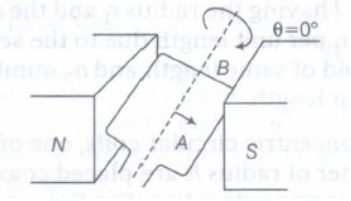
30) The self-inductance of a coil is 2 mH. The rate of flow of current in it is 10^3 A/S. The induced electromotive force in the coil is 1
(a) 1V (b) 2V (c) 3V (d) 4V

31) The self inductance L of a solenoid of length I and area of cross-section A, with a fixed number of turns N increases as 1
(a) l and A increase (b) I decreases and A increases
(c) l increases and A decreases (d) both l and A decrease

32) If a medium of relative permeability μ_r had been present instead of air, the mutual inductance would be 1
(a) $M = \mu_r \mu_0 n_1 n_2 \pi r_1 l$ (b) $M = \mu_0 n_1 n_2 \pi r_1^2 l$ (c) $M = \mu_r n_1 n_2 \pi r_1^2 l$
(d) $M = \mu_r \mu_0 n_1 n_2 \pi r_1^2 l$

33) Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon 1
(a) the rates at which currents are changing in the two coils
(b) relative position and orientation of the two coils
(c) the materials of the wires of the coils (d) the currents in the two coils

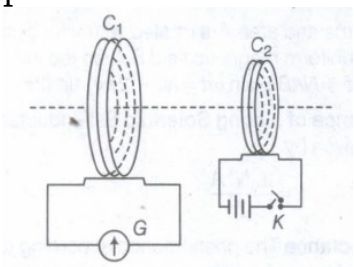
34) The effective area of the coil exposed to the magnetic field lines changes with time, the flux at any time is 1



(a) $\phi_B = BA\cot\omega t$ (b) $\phi_B = BA\cos\omega t$ (c) $\phi_B = BA\tan\omega t$
(d) $\phi_B = BA\sec\omega t$

35) A square of side L metres lies in the xy-plane in a region, where the magnetic field is given by $B = B_0(2\hat{\mathbf{i}} + 3\hat{\mathbf{j}} + 4\hat{\mathbf{k}})T$, where B_o is constant. The magnitude of flux passing through the square is 1
(a) $2B_0L^2$ Wb (b) $3B_0L^2$ Wb (c) $4B_0L^2$ Wb (d) $\sqrt{29}B_0L^2$ Wb

36) What will happen with the galvanometer when the tapping key K is pressed? 1



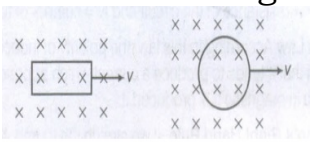
(a) A momentary deflection (b) A long time deflection (c) No deflection
(d) None of the above

37) The magnitude of the induced emf in a circuit is equal to the time rate of change of magnetic flux through the circuit, is statment of 1
(a) Fleming's right hand rule (b) Fleming's left hand rule
(c) Felming's third law (d) Faraday's law of electromagnetic induction

38) The direction of induced current is decided by 1
(a) Lenz's law (b) Fleming's left hand rule (c) Biot-Savart's law
(d) Ampere's law

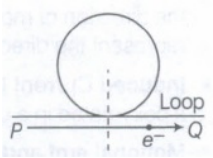
39) A 50 turns circular coil has a radius of 3 cm, it is kept in a magnetic field acting normal to the area of the coil. The magnetic field B increased from 0.10 T to 0.35 T in 2 ms^{-1}, The average induced emf in the coil is 1
(a) 1.77V (b) 17.7V (c) 177V (d) 0.177V

40) A rectangular loop and a circular loop are moving out of a uniform magnetic field region in the given figure to a field-free region with a constant velocity v. In which loop do you expect the induced emf to be constant during the passage out of the field region? 1



(a) Rectangular loop (b) Circular loop (c) Both (a) and (b)
(d) Neither (a) nor (b)

41) An electron moves along the line PQ which lies in the same plane as a circular loop of conducting wire as shown in figure. What will be the direction of the induced current in the loop? 1



(a) Anti-clockwise (b) Clockwise (c) Alternating
(d) Non-current will be induced

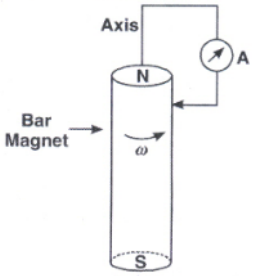
42) Eddy currents are generated in 1
(a) insulator (b) conductor (c) Both (a) and (b) (d) Neither (a) nor (b)

43) If the number of turns in a coil becomes doubled, then it self-inductance will become 1
(a) double (b) halved (c) four times (d) unchanged

44) The self-induced emf in a coil of 0.4 H self-inductance when current in it is changing at the rate of 50 As^{-I}, is 1
(a) 8×10^{-4} V (b) 8×10^{-3} V (c) 20V (d) 500V

45) A loop, made of straight edges has six corners at A (0, 0, 0), B (L, 0, 0), C (L, L, 0), D(0, L, 0), E (0, L, L) and F (0, 0, L). A magnetic field $B = B_0\left(\hat{i} + \hat{k}\right) T$ is present in the region. The flux passing through the loop ABCDEFA (in that order) is. 1
(a) B_0L^2Wb (b) $2B_0L^2Wb$ (c) $\sqrt{2}B_0L^2Wb$ (d) $4B_0L^2Wb$.

46) A cylindrical bar magnet is rotated about its axis. A wire is connected from the axis and is made to touch the cylindrical surface through a contact. Then 1



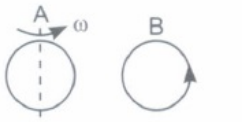
(a) a direct current flows in the ammeter A.

(b) no current flows through the ammeter A.

(c) an alternating sinusoidal current flows through the ammeter A with a time period $T = \frac{2\pi}{\omega}$

(d) a time varying non-sinosoidal current flows through the ammeter A

47) Same as question 4 except the coil A is made to rotate about a vertical axis (Figure). No current flows in B if A is at rest. The current in coil A, when the current in B (at t = 0) is counterclockwise and the coil A is as shown at this instant, t = 0, is 1



(a) constant current clockwise. (b) varying current clockwise

(c) varying current counterclockwise

(d) constant current counterclockwise

48) When current in a coil changes from 5 A to 2 A in 0.1 s, average voltage of 50 V is produced. The selfinductance of the coil is 1

(a) 1.67 H (b) 6 H (c) 3 H (d) 0.67 H

49) A coil having 500 sq. loops of side 10 cm is placed normal to magnetic flux which increases at a rate of 1 T/s. The induced emf is 1

(a) 0.1 V (b) 0.5 V (c) 1V (d) 5V

50) A coil of 100 turns carries a current of 5 mA and creates a magnetic flux of 10^{-5} weber. The inductance is 1

(a) 0.2 mH (b) 2.0 mH (c) 0.02 mH (d) 0.002 H

51) Lenz's law of electromagnetic induction is as per law of conservation of 1

(a) energy. (b) momentum angular. (c) charge. (d) electromotive force.

52) The current flows from A to B is as shown in the figure. The direction of the induced current in the loop is 1

(a) clockwise. (b) anticlockwise. (c) straight line.

(d) no induced e.m.f. produced.

53) In a coil of self-induction 5 H, the rate of change of current is 2 As^{-1}. Then emf induced in the coil is 1
(a) 10V (b) -10V (c) 5V (d) -5V

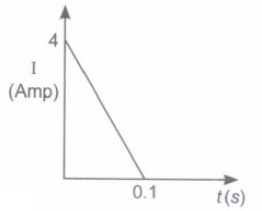
54) The self-inductance L of a solenoid of length I and area of cross-section A, with a fixed number of turns N increases as 1
(a) I and A increase (b) I decreases and A increases
(c) I increases and A decreases (d) both I and A decrease.

55) A metal plate is getting heated. It can be because 1
(a) a direct current is passing through the plate
(b) it is placed in a time varying magnetic field.
(c) it is placed in a space varying magnetic field, but does not vary with time.
(d) a current (either direct or alternating) is passing through the plate

56) The self-inductance of a coil having 500 turns is 50 mH. The magnetic flux through the cross-sectional area of the coil, while current through it is 8 mA, is found to be 1
(a) 4×10^{-4} Wb (b) 0.04 Wb (c) 4 μ Wb (d) 40 m Wb

57) While keeping area of cross-section of a solenoid same, the number of turns and length of solenoid are both doubled. The self-inductance of the coil will be 1
(a) halved. (b) doubled. (c) 1/4 times the original value
(d) unaffected.

58) In a coil of resistance 10π, the induced current developed by changing magnitude of change in flux through the coil is weber is 1



(a) 8 (b) 2 (c) 6 (d) 4

59) A metal ring is held horizontally and bar magnet is dropped through the ring with its length along the axis of the ring. The acceleration of the falling magnet is 1
(a) equal to g. (b) less than g. (c) more than g.
(d) first increases then decreases.

60) A coil of resistance 400Ω is placed in a magnetic field. If the magnetic flux Φ linked with the coil varies with times t (see) as $\Phi = 50t^2 + 4$, the current in the coil at t = 2 sec is 1
(a) 0.5 A (b) 0.1 A (c) 2 A (d) 1 A

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1) (a) which normal to surface area makes with the direction of magnetic field 1

2) (b) weber 1

3) (d) change in magnetic flux 1

4) (c) 1

Large the amount of magnetic flux linked with a circuit, greater is the e.m.f. induced in it.

5) (b) $dQ = \frac{d\phi}{R}$ 1

6) (d) Transformers 1

7) (c) 1 henry = $\frac{1volt}{1\ amp/sec}$ 1

8) (d) 4 1

9) (b) 4×10^{-3}V 1

10) (a) 1 V 1

11) (c) Capaciatnce 1

12) (c) $\frac{R}{L}$ 1

13) (c) 180° 1

14) (b) NAB ω 1

15) (a) speed of rotation of coil 1

16) (d) transformer 1

17) (b) d.c generator 1

18) (d) step up/step down transformer 1

19) (b) l decrease and A increase 1

20) (b) the coil moving in a time varying magnetic field 1

21) (a) increases when they are brought nearer 1

22) (d) $\frac{\left(B\pi r^2\omega\right)^2}{8R}$ 1

23) (b) $2\pi rB\left(\frac{dr}{dt}\right)$ 1

24) (b) $\frac{-n(\phi_2-\phi_1)}{5Rt}$ 1

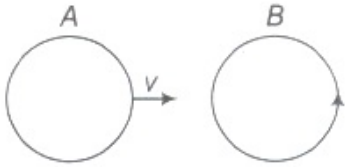
25) (a) 10 J 1

26) (c) Both (a) and (b) 1

27) (b) 40V 1

28) (d) 1

there is a constant current in the counter clockwise direction in A



29) (b) 3 mV 1

30) (b) 2V 1

31) (b) I decreases and A increases 1

32) (d) $M = \mu_r \mu_0 n_1 n_2 \pi r_1^2 l$ 1

33) (b) relative position and orientation of the two coils 1

34) (b) $\phi_B = BA\cos\omega t$ 1

35) (c) $4B_0L^2$ Wb 1

36) (a) A momentary deflection 1

37) (d) Faraday's law of electromagnetic induction 1

38) (a) Lenz's law 1

39) (b) 17.7V 1

40) (a) Rectangular loop 1

41) (a) Anti-clockwise 1

42) (b) conductor 1

43) (c) four times 1

44) (c) 20V 1

45) (b) $2B_0L^2Wb$ 1

46) (a) a direct current flows in the ammeter A. 1

47) (a) constant current clockwise. 1

48) (a) 1.67 H 1

49) (d) 5V 1

50) (c) 0.02 mH 1

51) (a) energy. 1

52) (a) clockwise. 1

53) (b) -10V 1

54) (b) I decreases and A increases 1

55) (a) a direct current is passing through the plate 1

56) (a) 4 x 10^{-4} Wb 1

57) (b) doubled. 1

58) (b) 2 1

59) (b) less than g. 1

60) (a) 0.5 A 1